

CLAIMS

1. A method for obtaining a ferroelectric composite material, comprising the steps consisting in:
 - 5 - coating particles of a ferroelectric compound with a layer of a dielectric; and
 - forming a dense composite material by sintering the coated particles,characterized in that the coating step comprises bringing the particles of the ferroelectric compound into contact with a fluid containing at least one solvent and a precursor of the dielectric, the fluid being maintained under pressure.
- 15 2. The method as claimed in claim 1, characterized in that the fluid is maintained at a temperature above 10°C.
- 20 3. The method as claimed in either of claims 1 and 2, characterized in that the fluid containing the solvent and the precursor is maintained under supercritical temperature and pressure conditions.
- 25 4. The method as claimed in one of the preceding claims, characterized in that it further includes a prior step of synthesizing the ferroelectric compound particles, this synthesis being carried out under pressure.
- 30 5. The method as claimed in claim 4, characterized in that the synthesis of the particles is carried out at a temperature above 10°C.
- 35 6. The method as claimed in either of claims 4 and 5, characterized in that the synthesis is carried out under supercritical temperature and pressure conditions.

7. The method as claimed in one of the preceding claims, characterized in that the ferroelectric compound is chosen from the following materials:
5 PbTiO₃, PZT, PMN, LiNbO₃, KNbO₃, KTN, BaTiO₃ and BaTiO₃-SrTiO₃.
8. The method as claimed in one of claims 1 to 7, characterized in that the ferroelectric is Ba_xSr_{1-x}TiO₃ or BaTiO₃.
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9. The method as claimed in one of the preceding claims, characterized in that the dielectric compound is chosen from oxides or nitrides.
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10. The method as claimed in claim 9, characterized in that the dielectric compound is chosen from the following oxides: Al₂O₃, SiO₂, TiO₂, MgTiO₃, ZrO₂, HfO₂, SnO₂, SnO₃ and Ta₂O₅.
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11. The method as claimed in one of the preceding claims, characterized in that the precursor of the dielectric compound is chosen from the family of salts, metal and organometallic complexes, especially from the family of acetates, acetylacetonates or alkoxides.
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12. The method as claimed in one of the preceding claims, characterized in that the solvent comprises CO₂ or NH₃.
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13. The method as claimed in one of claims 1 to 12, characterized in that the solvent is chosen from alcohols, water or a mixture thereof.
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14. The method as claimed in one of the preceding claims, characterized in that the ferroelectric compound particles have dimensions of around 5 nm to 1 μm.

15. The method as claimed in one of the preceding claims, characterized in that the dielectric compound coating layer has a thickness of around 1 nm to 10 μm .
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16. A composite material formed from coated ferroelectric particles in a matrix of a dielectric compound, characterized in that the dielectric compound matrix is formed from particles.
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17. The material as claimed in claim 16, characterized in that the size of the particles forming the matrix is between 1 nanometer and a few millimeters.
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18. The material as claimed in either of claims 16 or 17, characterized in that the ferroelectric particles have dimensions of around 5 nanometers to 1 micron.
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19. The material as claimed in one of claims 16 to 18, characterized in that the ferroelectric particles are formed from $\text{Ba}_x\text{Sr}_{1-x}\text{TiO}_3$.
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20. The material as claimed in one of claims 16 to 19, characterized in that the dielectric compound matrix is formed from Al_2O_3 .